“Introduction to UC San Diego’s Integrated Digital Infrastructure”

Opening Talk
IDI Showcase 2015
University of California, San Diego
May 6-7, 2015

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What is IDI?

• **5 Partnering Units:**
  - The Library
  - Administrative Computing & Telecommunications (ACT)
  - Academic Computing and Media Services
  - SDSC
  - Qualcomm Institute

• **A Process to Support UCSD Strategic Plan With an Integrated Digital Infrastructure**
  - **Concierge service** to Identify the Right Mix of Services to Meet Faculty and Research Staff Needs
  - **Coordination** Across Units to Ensure Research Needs are Met Efficiently and Effectively
  - **Transformational Projects** and **Digital Research Platforms** to Enhance Research and Education
  - **Supporting a Research Data Library and Critical High Performance Cyberinfrastructure**
IDI Supporting UCSD’s Strategic Plan

• **Transformational Projects** & big data instructional support give our students hands-on experience with new technology and industry-standard tools (Goal 1)

• **Collaboration & communications technology**, including high-speed networking & electronic lab notebooks, improves interaction & reduces barriers to participation and makes cross-campus & multidisciplinary research practical (Goals 2 & 3)

• **High-performance computing & networking** supports big data research for economic & social improvement, allows us to deploy science for the public good faster (Goal 4)

• **Digital Research Platforms** that serve multiple researchers reduce excess spending, focus technology and research growth, and ensure good stewardship of public funds (Goal 5)
Making Critical High Performance Cyberinfrastructure Seamlessly Available to IDI Users Where They Work

- **Oasis Data Store**
  - > 13,000 TB
  - > 800 Gbps

- **SDSC Supercomputers**
  - Gordon

- **TSCC & Co-Lo**
  - 1-16

- **Prism@UCSD**
  - 8

- **UCSD IDI Users**
  - 4

- **CENIC**
  - 288
  - 128
  - 384

- **384 x 10Gbps = 3.8Tbps**

- **# of Parallel 10Gbps Optical Light Paths**
Large Memory High Performance Computing Enables Comparison Across Human Gut Microbiome of Patients with Autoimmune Diseases and Healthy Subjects

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ABSTRACT
Microbial communities that live on the outside and inside of the human body dramatically influence human health and diseases. In recent years, major progress has been made in understanding the human microbiome communities through projects such as the

1. INTRODUCTION
The microbes that live in and on the human body outnumber the human cells by 10-fold. The collective human microbial communities, known as the human microbiome, play a profound
Digital Research Platform: Distributed IPython/Jupyter Notebooks: Cross-Platform, Browser-Based Application Interleaves Code, Text, & Images

IJulia
IHaskell
IFSharp
IRuby
IGo
IScala
IMathics
Ialdor
LuaJIT/Torch
Lua Kernel
IRKernel (for the R language)
IERlang
IOCaml
IForth
IPerl
IPerl6
loctave
Calico Project
  • kernels implemented in Mono, including Java, IronPython, Boo, Logo, BASIC, and many others

IScilab
IMatlab
ICSharp
Bash
Clojure Kernel
Hy Kernel
Redis Kernel
jove, a kernel for io.js
IJavascript
Calysto Scheme
Calysto Processing
idl_kernel
Mochi Kernel
Lua (used in Splash)
Spark Kernel
Skulpt Python Kernel
MetaKernel Bash
MetaKernel Python
Brython Kernel
IVisual VPython Kernel

Evolved from the IPython Project

Source: John Graham, QI
Digital Research Platform Software System Being Used by Numerous IDI Transformational Projects

Source: John Graham, QI
# IDI Showcase Speakers

**WEDNESDAY, MAY 6 10AM-12PM/SCHOOL OF MEDICINE/MET LEARNING CENTER**

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<td>WiFIRE/UCSD GIS effort</td>
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<td>Jurgen Schulze, QI/CSE &amp; Trey Ideker, Medicine</td>
<td>Creating greatly expanded, scalable visualization capability for graphing gene and cellular networks</td>
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<td>Rommie Amaro, Chemistry &amp; Biochemistry</td>
<td>Rational drug design</td>
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<td>Falko Kuester, SE</td>
<td>Prototype lab for student access to drones</td>
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<td>Lucila Ohno-Machado, Medicine</td>
<td>Establish a scalable Health Sciences HIPAA cloud for human-generated data</td>
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<td>Mark Ellisman, Neuroscience</td>
<td>Crack the living cell nucleus</td>
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<td>Frank Wuerthwein, Physics</td>
<td>Large Hadron Collider/CMS Data Tier Two site</td>
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<td>Brenda Bloodgood, Biology</td>
<td>Neuronal computation changes in response to interactions with the environment</td>
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<td>Greg Hidley, CalIT2</td>
<td>SDSC's High Performance Wireless Research and Education Network</td>
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<td>Jules Jaffe, MPL</td>
<td>Underwater imaging of plankton/phytoplankton</td>
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<td>Kim Albizati, Chemistry &amp; Biochemistry</td>
<td>Undergraduate instruction in upper-division Chemistry</td>
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<td>Thomas Levy, Anthropology</td>
<td>Evolution of societies in the southern Levant from the Neolithic to Islamic periods</td>
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<td>Mehrdad Yazdani, QI</td>
<td>Twitter Big Data study measuring happiness of metro areas</td>
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<td>Alison Marsden, MAE</td>
<td>Graduate instruction on computational fluid dynamics</td>
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<td>Rob Knight, Pediatrics</td>
<td>Radically advance UCSD’s capabilities in multi-omic integration of the human microbiome</td>
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